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TECHNOLOGY BASED INNOVATIONS AND NON-INTEREST INCOME OF LISTED DEPOSIT MONEY BANKS IN NIGERIA

Emmanuael Ogbonnaya Eze[1] Benjamin Chuka Osisioma[2] Gloria Ogochukwu Okafor[3] Angus, O. Unegbu[4]

[1,2&3]*Department of Accountancy, Faculty of Management Sciences, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria.*
1. Email: ezemma20@gmail.com
2. Email: bc.osisioma@unizik.edu.ng
3. Email: go.okafor@unizik.edu.ng

Correspondence: ezemma20@gmail.com

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ABSTRACT

The study investigated the effect of technology based innovations on non-interest income of deposit money banks in Nigeria from 2012 to 2023. Ex-post facto research designs was adopted and panel least squares regression was employed to analyse the data using descriptive, correlation test and regression estimation. The major findings in the study indicated that technology based innovation variables such as expenditure on information technology (IT) has a positive and significant effect on non-interest income of deposit money banks. The number of online customers has a significant and positive effect on non-interest income of deposit money banks. More so, F-statistic value of 8.514 at the 1 percent level reveals that a significant relationship exists between the dependent variable and the independent variables combined. Based on the results, it was recommended that investment in IT infrastructure should be a strategic decision by banks in Nigeria and that banks need to strengthen their internet infrastructure and increase its capacity as more customers flow into the system.

1. INTRODUCTION

Recent policy changes and the wave of information computer technology in the Nigerian deposit money banks have had significant effect in the operations and income earning ability of the banks. The consolidation policy by Professor Charles Soludo in 2007, the Treasury Single Account (TSA), introduced by the Jonathan administration in 2012 and its implementation by the federal government under Buhari's administration in 2015 and the Islamic banking in Nigeria which operates interest free bank coupled with the COVID 19 Pandemic have affected the banks' system of operations and the traditional interest income. Technological innovation signifies the discovery of new ways of performing previous activities in a manner that involves speed, accuracy, reliability, integrity, fidelity, satisfaction and timeliness. The trend of this innovation is revolutionizing the world in all aspects

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(Thiongo, 2022). The Nigerian deposit money banks have no option than to adapt to this contemporary development. However, investment in this cutting-edge product and its expansion to bring reasonable number of users into the platform is a humongous capital expenditure. The interest income arising from it is known as non-interest income. Today, many bank customers can make payment wherever they are either through the automated teller machine, (ATM), point of sale terminals (POS), or android phone through the internet or customer online banking among several other payment channels. These channels reduce the number of queues in the banking hall while saving time of being physically present in the bank (brick and mortar system). Investment in information technology and the number of online customers are increasingly being adopted by deposit money banks in Nigeria.

Numerous studies have been carried out on financial performance and non-interest income of deposit money banks in Nigeria few of which are Bello (2024); Obadiaru and Ogunyemi (22024); Jolaiya (2023); Uniamikogbo, Okoye, Adeusi and Meshack (2020). These studies were conducted either on non-interest income and financial performance or technology based innovations and financial performance. However, Bello (2024) examined the effect of technology investment on non-interest income using machinery and investment as proxy for performance, the dependent variable. Also limited studies have been conducted by foreign economies based researchers in this contemporary topic. To the best of the researcher's knowledge, some of these cross border studies are from Kenya, Ghana, Indonesia (Alubisia, 2018; Ankrak, 2019; Andi, 2019). Given the sweeping effect of this cutting-edge technology and the humongous investment that the bank is committing towards the innovation, it is pertinent to examine whether the income realized justifies the cost involved.

1.1 Objectives

The main objectives of the study is to investigate the effect of technology based innovations on non-interest income of listed deposit money banks in Nigeria. The specific objectives are:

1. to ascertain the effect of information technology expenditure on non-interest income of listed deposit money banks in Nigeria.
2. To investigate the effect of number of online banking customers (internet banking) on non-interest income of listed deposit money banks in Nigeria.

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1.2 Hypotheses

Based on the objectives of the study, the following hypotheses were developed:

H_{01} Information technology expenditure has no significant effect on non-interest income of listed deposit money banks in Nigeria

H_{02} Number of online banking customers (internet banking) has no significant effect on non-interest income of listed deposit money banks in Nigeria.

2. LITERATURE REVIEW

2.1 Conceptual Review

2.1.1. Technology Based Innovations

This is also referred to as digital disruptions or a combination of multiple state-of-the-art innovations which can affect the existing way of doing things (Li, Dai, & Cui, 2020). Terer and Gichure,(2020) describe technology based innovations as strategy or innovation strategies used by banks to develop, implement innovative financial instruments and processes and formulation of creative solutions to problems in finance. It involves technological innovations linked with preventive measures and facilitation of transactions processing, reduction of operating costs, improvement of efficiency of service processes, and achieving best service quality.

2.1.2 Non-Interest Income

It refers to different charges by deposit money banks acting as means of making money to ensure banks' liquidity. Ogbonna (2021) defines it as revenue taken in by financial institutions from account-related fees and charges on services rendered to customers. Non-interest income is the outcome of the challenges facing the financial institutions due to the current banking environment and legal requirements. In the current dispensation, banks offer services that are outside the core banking or traditional banking activity of intermediation from which income are earned through fee, general services, commission etc. (Yao, Haris, and Tariq, 2018).

2.1.3 Information Technology Expenditure (IT)

Expenditure on information technology is seen as a driven force in the value chain that creates competitive advantage. Organisations that do not comply by investing in the information technology certainly experience a crowding out effect. (Babina, Anastassia, Alex and James, (2021) attribute this reason for the phenomenal increase in expenditure on information

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technology in the post global financial crisis. Studies show that expenditure in information technology is beneficial for financial inclusion given that they facilitate clients' online interaction with banks, allowing for greater reach to rural and poorer neighbourhoods (Berg, Fuster, and Puri, 2019; Pierri and Timmer, 2022).

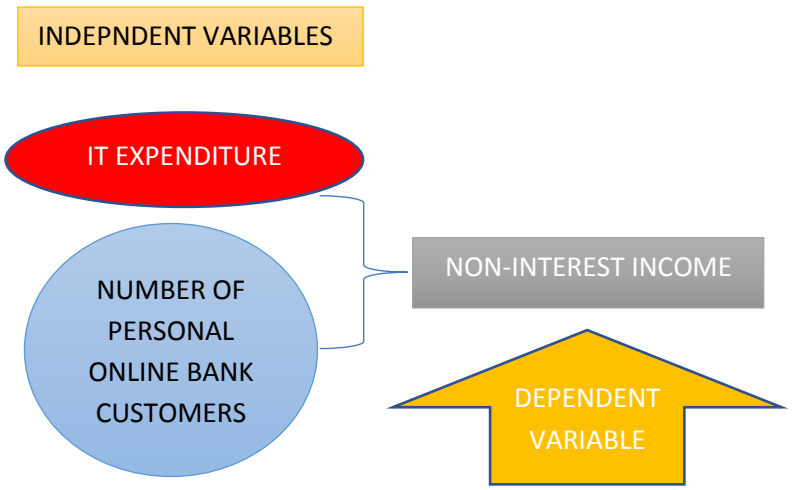

Figure 1: Conceptual framework

Source: Researchers' concept

2.1.4 Personal On-Line Banking Customers

Personal online banking is electronic banking, virtual banking or internet banking where customers undertake various financial transactions, the financial institutions' interactive and communication website (Arilesere, Olaleye, Asaolu and Akenabor, 2021). The use of electronic banking helps customers to shop, pay bills, purchase thing, join in closeout e.g. Amazon.com and E-Bay, and exchange cash from any place whenever thereby avoiding the problems of going to the bank with the associated costs. However, there are mixed reactions as to the real effect of personal online banking internet or electronic banking income..

2.2 Silber's Constraint Theory of Innovations

This theory was developed by Silber in 1975 with the objective of explaining the reason behind financial institutions' engagement in financial innovations. Based on his observations, Silber realized that the adoption of technology based innovation was an attempt to widen the income base and efficiency of firms through seamless service delivery. From the perspective of its utilization by deposit money banks, it is therefore a key driver in financial inclusion,

reduction of operational costs while vigorously improving deposit money banking efficiency and service delivery (Popoola, 2021). Banks can leverage on the development resulting from adopting the cutting-edge technology to enhance their efficiency and diversify their income base than relying only on traditional interest income. The paper anchors on this theory because modern way of service delivery tends to draw more customers to the banks' various products and at the same time saves a humongous administrative cost for the banks (Weidong, & Yuan, 2021).

2.3 Empirical Review

Alubisia, Githii, and Mwangi (2018) conducted an ex post facto study to identify the impact of technology based financial innovation on non-interest income in Kenyan commercial banks. The study investigated how the adoption of internet or online banking and other forms of technology based banking variables have influenced the non-interest income of commercial banks in Kenya. Descriptive research design was utilized while a multiple regression analysis was carried out to illustrate the relationship between the independent and dependent variables. Results indicate that there is a strong positive relationship between non-interest income and online banking. Its relationship with income from online banking is positive and relatively strong as indicated by a correlation coefficient of 0.594 (p=0.001)

Thiongo (2022) investigated the effect of financial innovation on the non-interest income of commercial banks in Kenya. The study examined in particular, the effect of online banking, agency banking and mobile banking key financial innovation on non-interest income of commercial banks. The study employed a census approach in the selection of the 39 commercial banks that have adopted agency banking in Kenya by year 2020. The study covers year 2011-2020 and is made up of secondary data which were collected from the audited financial statements of the commercial banks and the Central bank of Kenya. Descriptive statistics and correlation analysis using STATA software computed central tendency measures as well as the measures of dispersion. The determination of the effect of the independent variables on the dependent variable (non-interest income) was arrived at by utilizing a Multivariate Pooled Ordinary Least Squares method in addition to several diagnostic tests such as correlation analysis, heteroscedasticity, multicollinearity, and autocorrelation. The result of fixed effect model which was appropriate for the study shows a positive effect of internet banking on the bank's non - interest income, a positive and significant effect of agency banking on non – interest income of banks and a positive and significant effect of mobile banking on the non - interest income of commercial banks.

However, the effect of online or internet banking on non-interest income was found to be insignificant at 5% level of significance.

Li (2022) conducted a study to assess the impact of internet finance on the banking industry in China using data from 115 commercial banks in China, from 2011 to 2018. A fixed effect model with annual financial data of the 115 commercial banks was employed for the analysis. The banks were divided into four main classes on the basis of ownership: large state-owned commercial banks, joint-stock commercial banks, urban commercial banks and rural commercial banks which form representative sample for the study. The annual financial data were sourced from CSMAR database and the annual reports of the banks. Other sources of data for the study were National Bureau of Statistics, China Industry Information Network, iResearch website and the Statistical Report of China's Internet Development. The independent variable, development of internet finance was proxied by the scale of third party payment and peer to peer (P2P) lending while the dependent variables, non-interest income and interest income were proxied by profitability. The robustness of the study was taken into consideration by introducing gross domestic product (GDP) as a control variable. The analysis of the data was done by adopting descriptive statistics and multiple linear regressions. Findings from the study indicate that internet finance has a positive spill-over effect on non-interest income of banks. The result of the study shows that the development of internet finance promotes the diversity of financial markets and accelerates the circulation speed of money. However, the result of the study further shows a negative impact of internet finance on interest income.

Ogege and Boloupremo (2020) examined the evolvement of financial technology (fintech) in Nigeria's commercial capital city, Lagos, and it impacts on transactions transfer of financial services in Nigeria. The researcher adopted the purposive sampling technique to select a sample size of 400 respondents from a population of 22,600,000 based on the population estimate by the state government in 2017. The sample was arrived at using the Taro Yameni formular. ANOVA regression analysis was used to analyse the data. The findings of the study revealed that many factors drive the utilization of technological advancement especially by the contemporary younger age users of financial services. Besides, , it was discovered that many customers have preference for Fintech companies to traditional financial institutions in terms of service and this changes the dynamics of competition in the delivery of financial services in Nigeria.

Andi (2019) examined the concept of information technology investment and digitalization effect on profitability and fee based income of banks listed in Indonesian stock exchange from 2014 to 2018. The sample for the study was 30 banks that meet the criteria for selection out of the 44 banks that are quoted in the country's stock market. The secondary data for the study were generated from the financials of the banks which were analysed using E views 8 software. The result or findings revealed that information technology investment had a positive effect on fee based or non-interest income and profitability. Digitalization also had a positive effect on fee based or non-interest income but insignificant effect on profitability of the banks; an indication that digitalization increases non-interest income though its operational income is comparatively high.

Shyaka (2021) analysed the performance of electronic banking tools such as automated teller machine (ATM), mobile banking and internet banking on the revenue of commercial banks in Rwanda from 2016 to 2020. Descriptive survey and correlational design were adopted in the study involving a sample size of fifty two members of staff from the bank of Kigali. Information was gathered through a form survey and interviews and SPSS version 22 supported data analysis process. In addition, secondary information such as financial statements, statements of profit or loss account and executive reports were obtained from the bank of Kigali. Regression analysis was adopted to examine the relationship between electronic banking tools and revenue generation of bank of Kigali. Results show that automated teller machine (ATM) from the overall mean and standard deviation of 4.612 and 0.4882 respectively, contributed significantly to bank revenue, mobile banking with mean of 4.556 and standard deviation of 0.481 contributed to the revenue of bank of Kigali. From the angle of correlation, automated teller machine with a ratio of 0.700, mobile banking with a ratio of 1.00 and internet banking with a ratio of 0.422 respectively, indicated a positive degree of relationship between electronic banking tools and the bank performance.

Xia and Chunsom (2018) explored the effects of Chinese third-party payments on commercial banks' non-interest income over the period 2008-2017. Data for the analysis were obtained from China iResearch third party mobile payment report from 2013-2017, mainly from the Bankscope database and bank's annual report. A total of 16 listed deposit money banks operating in China between 2008 and 2018 represented the study sample. This sample is made up of 5 large state-owned deposit money banks, 8 joint-equity deposit money banks, and 3 city deposit money banks respectively. In conducting the analysis, the random effects panel data technique was adopted. Results of the regression analysis show that for overall banks,

higher desktop payment produces higher non-interest income, whereas the mobile payment does not yield the non-interest income. Investigating whether third-party payment wields different effects across bank types, interaction terms and dummy variables were included in the regression. Results show that from the viewpoint of bank types, small-medium deposit money banks reap the positive spillover effects. However for large state-owned deposit money banks, the non-interest income suffers a loss when desktop payment and mobile payment are growing.

Bello (2023) examined the concept of information technology investment and digitalisation in increasing profitability and non-interest income taking company size as a control variable. The population of the study consists of all banks listed on the Nigeria Stock Exchange. The research is quantitative in nature using secondary data from the bank's financial statements, which were analysed using the EViews 8 software. The results of the study show that financial technology investment had a positive effect on profitability and non-interest income, whereas, digitalisation positively affects non-interest income but its effect on profitability was insignificant. This explains that digitalisation increases non-interest income, but its contribution to profitability is insignificant.

3. MATERIAL AND METHOD

The study adopted the *ex-post facto* research design which is appropriate for the study because the researcher has no influence over the already existing data. The population of the study consists of all the twelve (12) listed deposit money banks in the Nigeria Exchange Group as at 31st December 2023. They are: 12 DMBs (Access, FCMB, Fidelity, GTCO, Sterling, Stanbic IBTC, Union, UBA, Unity, Wema, First bank and Zenith). However, a sample of seven banks was chosen using purposive approach and on the basis of data availability as at 31st December 2023. The paper employed a panel dataset involving cross sectional and time series in which each of the variables was repeatedly collected for each bank for each of the years under study. The secondary data from the audited annual reports and sustainability reports covers 2012 -2023.

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Table 1 Operationalisation of Varables

Variables	Definition	Measurement
Independent variables (Technology Based Innovations)		
ITEXP	InformationTechnology Expenditure	Amount Spent on IT Infrastructure
ONL	Online Customers	Number of online customers
Dependent Variable (Non-Interest Income)		
NINC	Non-Interest Income	Income from electronic products, commission on turnover and foreign currency transaction fees and commission.

Source: Researcher's compilation (2024)

This study adopted the approaches of Trivedi (2015) to seek to explain the contributions of technology based factors to non-interest income of DMBs in Nigeria. The model is specified in functional form as:

NINC= f(ITEXP, ONL, BSIZE,)……Eqn 1.

Where NINC = non-interest income of the banks

ITEXP = expenditure on information technology

ONL = number of on-line customers

BSsize = bank size

The model states that technology based innovation is a function of expenditure on information technology, number of online banking customers and bank size as control variable. Non-interest income proxy is a function of fees on electronic products, commission on turnover and foreign currency transaction fees and commission.

The econometric form of the specified model is:

$NINC_{it} = \beta_0 + \beta_1 ITEXP_{it} + \beta_2 ONL_{it} + \beta_1 SIZE_{it} + \varepsilon_t$ ……..*Eqn 2.*

Where β_0 = Constant of regression coefficient

β_1- β_2 = Regression coefficients of the independent variables

ε = stochastic error term of the regression model

i = a given bank ($i = 1,2,3, \ldots,7$)

t = time period ($t = 1,2,3,\ldots,12$)

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4. RESULT AND DISCUSSIONS

4.1 Data Analysis

The correlation analysis also provides relevant estimates for evaluating the possible presence or absence of multicollinearity in the estimated models. Multicollinearity is expected to exist in the model if any two explanatory variables have a correlation coefficient greater than 0.7. The correlation result in Table 2 shows that a positive and significant relationship exists between expenditure on IT by banks and online transactions. In the correlation matrix, none of the variables has a coefficient that is greater than 0.7. This implies that there is no risk of multicollinearity in the estimated models in the study.

Table 2: Correlation Matrix

Variables	NINC		ITEXP		NLBN			BSIZE
NINC	1							
ITEXP	0.30 (0.00)	0.54 (0.00)	1					
NLBN	0.15 (0.15)	0.36 (0.00)	0.57 (0.00)		1			
BSIZE	0.12 (0.26)	0.69 (0.00)	0.51 (0.00)	0.68 (0.00)	0.52 (0.00)	0.36 (0.00)	0.44 (0.00)	1

Source: Researcher's Computation via E Views 10 Computation

4.1.2 Unit Root and Cointegration Tests

Bank-specific characteristics (or individual and heterogeneity) and common (or homogenous) characteristics of the banks included in the sample for the study reflect in the data employed for this study. For this reason, the use of panel unit root tests to determine the stationarity of the data is employed to avoid incidence of "spurious" inference. In this study, the test developed by Levin, Lin and Chu (LLC) was used to examine the stationarity properties of the homogenous panel. Here, identical cointegration vectors among the banks are assumed. Additionally, to account for the differences exhibited by individual banks, the Im, Pesaran and Shin (IPS, 2003) and the Augmented Dickey-Fuller tests (which allow for heterogeneity in the panel's cross-section and assumes a null hypothesis of no cointegration in the panel data) are also conducted. The unit root test results for the variables in levels are presented in Table.3. In the result, none of the variables has a significant LLC coefficient (at the 5 percent level). This means that none of the variables is stationary in levels.

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Table 3: Panel Data Unit Root Tests Results in Levels

Variables	*Common unit process*	*individual unit root process*		
	LLC	**IMP**	**ADF**	**PP-Fisher**
NINC	0.71	1.91	8.82	9.46
ITEXP	1.14	2.32	9.24	13.71
NLBN	-0.83	-0.73	20.32	53.86
BSIZE	0.77	-1.15	9.61	29.82

Source: Estimated by the Author. *Note: ** and * indicate significant at 1% and 5 % levels respectively; IPS = Im, Pesaran& Shin; LLC = Levin, Lin & Chu*

Table 4 presents the test for unit roots of the variables in first differences and it shows that the coefficients of all the variables in the LLC test are significant at the 5 percent level. The tests from IMP, ADF and PP-Fisher also confirm this outcome. Given this condition, it is shown that the variables became stationary after the first difference. Thus, the variables are all integrated of the same order one, showing that the variables will likely converge simultaneous in the same pattern, indicating that cointegration analysis can be performed for the variables with meaningful outcomes.

Table 4: Panel Data Unit Root Tests Results in First Difference

Variables	*Common unit process*	*individual unit root process*		
	LLC	**IMP**	**ADF**	**PP-Fisher**
NINC	-4.64**	-2.94	38.38*	79.58**
ITEXP	-3.77**	-1.46	26.35*	38.71
NLBN	-10.22**	-3.05	37.47**	29.01
BSIZE	-93.99**	-22.54	40.08**	67.60**

Source: Estimated by the Author. *Note: ** and * indicate significant at 1% and 5 % levels respectively; IPS = Im, Pesaran& Shin; LLC = Levin, Lin & Chu*

4.1.3 Test of panel estimation framework

The econometric analysis performed for the empirical analysis is majorly focused on estimating the panel data-based relationship between non-interest income and the hypothesized determinant factors. The standard Hausman test for random/fixed effects test was therefore used for identifying the time-varying conditions of the panel data in order to determine the method of panel analysis to be adopted. The result of the Hausman tests for

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each of the equations of the study is reported in Table 5. For this test, the null hypothesis is that a random effect exists in the cross sections of the data. Thus, if the coefficient of the Chi-square is significant, the null hypothesis is rejected, and then the random effect estimates become inefficient in capturing the relationships in the Equations.

In the results of the Hausman tests presented in Table 5, the Chi-Square values for each of the Equations pass the significance test at the 5 percent level. Thus, the null hypothesis of random effects is rejected in this case. This implies that the fixed effects estimation procedure is the most efficient procedure for estimating the relationships since misspecification cannot occur when the fixed effect procedures are employed in the estimation.

Table 5: Hausman Test Result for Panel Data Analysis

Test Summary	**Chi-Sq. Statistic**	**Chi-Sq. d.f.**	**Prob.**
Period random	30.91	7	0.00

4.1.4 Bank technology and non-interest income (Fixed Effect Estimation)

In this section the effects of technology on the non-interest income of the sampled banks are estimated and reported. Based on the objectives of the study, two bank technology indicators are considered. The Hausman test reported above demonstrates that the fixed effect estimation procedure is the most appropriate method.

Table 6: Result of Model Estimation

Variable	*Fixed effect*		
	Coeff.	**t-Statistic**	**Prob.**
NLBN	1.066	5.61	0.00
ITEXP	0.763	7.25	0.00
BSIZE	0.343	3.09	0.00
Constant	14.536	6.67	0.00
Adj. R-sq.	0.587		
F-stat.	8.514		

Source: Researcher's Computation via E Views 10

From the fixed effect results in Table 6, it is seen that the adjusted R-squared is 0.587 which indicates that over 58 percent of the systematic variations in non-interest income of the sampled banks is explained by the explanatory variables at any given period. The F-statistic

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value of 8.514 is also significant at the 1 percent level, which reveals that a significant relationship exists between the dependent variables and all the independent variables combined. Thus, there is evidence that the estimated model has a high overall performance in explaining the bahviour of non-interest income of the banks. The relevance of each of the technology variables in explaining the inflow of the banks' non-interest income is determined by considering the individual coefficients of the explanatory variables. A close look at the individual coefficients of the explanatory variables reveals that the coefficients of internet banking (NLBN) and expenditure on IT by the banks (ITEXP) are significant at the 1 percent level. This implies that online banking and IT expenditure by a bank significantly increases the non-interest income of the banks. In particular, a 1 percent increase in IT expenditure of banks leads to a 0.73 percent rise in non-interest income. In the same vein, a 1 percent rise in internet banking leads to 1.066 percent rise in non-interest income of the banks respectively.

The results of the regression in table 4.6 also suggest that banks' size matter in terms of the non-interest income. Therefore, it is pertinent to factor out the role of bank size in order to know how the technology factors affect non-interest income. The result of the fixed estimate is in Table 7. It can also be seen from the results with interaction terms that the coefficients of all the significant technology variables are similar, justified by 0.028 for ITEXP, and 0.022 for NLBN. This shows that the effect of each of the bank technology factor on non-interest income increases by the same ratio for larger bank, compared to smaller banks.

Table 7: Estimation of Result with Cognisance of Bank Size

Variable	*Fixed effect*			*Panel OLS*		
	Coeff.	**t-Statistic**	**Prob.**	**Coeff.**	**t-Statistic**	**Prob.**
ITEXP*SIZE	0.028	3.26	0.00	0.050	5.50	0.00
NLBN*SIZE	0.022	2.01	0.04	0.080	5.04	0.00
BSIZE	-0.759	-3.52	0.00	0.617	1.81	0.07
Constant	12.953	8.45	0.00	8.366	4.83	0.00
Adj. R-sq.	0.42			0.50		
F-stat.	10.68			6.28		

Source: Researcher's Computation via E Views 10

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4.2 Test of Hypotheses

The tests of the hypotheses of the study are based on the estimated coefficients of the model that was specified in Chapter Three and reported in Table 6 (the baseline result). The tests are performed at the 5 percent level of significance. The tests of the hypotheses also provide grounds for outlining policy directions as well as discussion of the results.

4.2.1 Hypothesis One

H_o: Expenditure on information technology (IT) has no significant effect on non-interest income of deposit money banks in Nigeria

The test of this hypothesis is based on the fixed effect estimate of the coefficient of ITEXP in Table 4.6. In the result, the coefficient is 0.763 ($p < 0.01$). This result shows that the coefficient passes the significance test at the 1 percent level. Thus, ITEXP is a significant factor in explaining non-interest income of deposit money banks in Nigeria. The null hypothesis is therefore rejected which implies that expenditure on information technology (IT) has a significant positive effect on non-interest income of deposit money banks in Nigeria. The result reveals that even when the size of a bank is accounted for, the impact of IT expenditure by the banks on non-interest income is still positive and significant. Thus, the study has demonstrated that banks that invest heavily in IT infrastructure reap direct rewards through increased non-interest income over time. The result from this study corroborates results from studies (Lia, 2023; Ogege & Boloupremo 2020) Indeed Ankrah (2019) found that the benefits of increased IT infrastructure by banks extend to the profitability ratios of the banks.

4.2.2 Hypothesis two:

H_o: The number of on-line customers has no significant effect on electronic income of deposit money banks in Nigeria

In order to test this hypothesis, the focus is on the coefficient of NLBN in the results in Table 4.6. The coefficient is 1.066 ($p < 0.01$. This shows that the coefficient of NLBN passed the significance test at the 1 percent level. Based on this outcome, the null hypothesis is also rejected in this case. Thus, it demonstrated that the number of on-line customers (internet banking infrastructure) has a significant and positive effect on non-interest income of deposit money banks in Nigeria. Even after the size of banks is accounted for, NLBN remained positive and significant, indicating that even smaller banks enjoy increased non-interest

income with greater online or internet banking systems. These results seem to align with findings by Xia (2018), Shyaka (2021), Li (2022) and Mohammed, et al (2022).

CONCLUSION AND RECOMMENDATIONS The Ministry of Finance should increase In The findings in the study are germane for policy direction and recommendation.

1. First the study has demonstrated that expenditure on IT by deposit money banks in Nigeria significantly and unequivocally promotes non-interest income for the banks. Thus, it is recommended that investment in IT should be a strategic decision by banks in Nigeria, especially given that modern banking in a global world depends on access to strong and wide variety of financial innovation.
2. It was also found that internet or online banking infrastructure is an important tool for increasing non-interest income of banks. Thus, banks need to strengthen their internet infrastructure and increase its capacity as more customers flow into the system. Internet-based business does not rely only on the banks, but on the level of internet access by customers. Thus, there is need to increase the internet access by individuals across the country in order to support the banking sector in Nigeria.

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